

THE 1959 ELLESMERE SHELF EXPEDITION

The 1959 Ellesmere Shelf Expedition represents a cooperative effort between the Terrestrial Sciences Laboratory of the Air Force Cambridge Research Center, the Arctic Institute of North America, and the Canadian Defense Research Board. Other agencies participating in the program were the United States Army Quartermaster Corps, the United States Naval Civil Engineering Laboratory, and the Hydrology Branch of the United States Geological Survey.

Personnel

Participants

F. Crowley	Scientific Leader	AFCRC
D. Anderson	Hydrologist	USGS
Maj. R. Baker	Observer	ARDC, Hqts.
G. Dalton	Journeyman	NCEL
S/Sgt. J. Grady	Field Assistant	AFCRC
R. Hansen	Ice Engineering	NCEL
R. Henely	Ice Engineering	NCEL
E. Hilton	Ice Engineering	AINA
J. Hudson	Photographer	AFCRC
A. Kingston	Camp Manager	AINA
J. Lotz	Meteorologist	AINA + DRB
W. Mattox	Assistant Glaciologist	AINA
G. Rourke	Assistant Geophysicist	AINA
PFC T. Turnbull	Assistant Meteorologist	QMR+E
P. Walker	Glaciologist	AINA
D. Well	Geologist	NCEL
I. Woodford	Journeyman	NCEL
F. Yost	Journeyman	NCEL
E. Zeller	Geologist	AINA

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Supporting Personnel

Capt. T. Douthit	Det. 4	AFCRC
Capt. R. Gray	Det. 4	AFCRC
Capt. D. Klick	Det. 4	AFCRC
Sgt. Brown	Det. 4	AFCRC
W. Phipps	Light Aircraft	AINA
H. Strong	Det. 4	AINA


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Supporting Agencies

4 Engine Branch of the AF Cambridge Research Center
Thule Radio Thule, Greenland

POLAR
PAM
5760

POLARPAM



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Supporting Agencies (Contd.)

Alert Radio	Alert, Ellesmere
55th Air Sea Rescue	Thule, Greenland.

During the period 16-19 May, nine personnel and fifty tons of supplies were airlifted from Thule, Greenland to the Ellesmere Ice Shelf. The airlift consisted of a series of five flights by the Air Force Cambridge Research Center ski-wheeled C-130 to an area one mile north of Ward Hunt Island. The first landing was made without the benefit of ground reconnaissance. The landing site proved to be so satisfactory from the point of view of aircraft requirements and those of the project that the same area was later used for the resupply flights of mid-September and the evacuation flight of 4 November .

In order to avoid the difficulties of operating entirely on ice during the melt, a camp was constructed on the northern shore of Ward Hunt Island. The camp complex consisted of a food, fuel, and lumber cache; a short gravel runway; two Jamesway shelters; and an assortment of lesser tents. The Jamesways were used for personnel, equipment storage, and communications. The camp's function was one of supporting field parties on the Shelf in the form of a final staging area, a communications point, and a supply depot. This mode of operating proved quite satisfactory for the entire period.

The main objective of the 1959 Ellesmere Shelf Expedition was to ascertain the normal conditions encountered on the Shelf in order to evaluate its potential for supporting air operations. Consequently, those processes actively contributing to the physical character of the Shelf were studied on a sufficient scale to determine normal Shelf behavior for the period. Specifically, the meteorology, surface hydrology, thermal structure, ablation, and topography of the Shelf were studied in order to determine norms for evaluating its present state of development.

Meteorology

The main meteorological station was established on the northern extreme of the Ward Hunt Ice Rise, some three miles north of the base camp. Here observations were carried out from 1 June to 8 September, comprising the standard screen measurements, wind and temperatures at four levels, incoming and outgoing short wave radiation, net radiative flux, and total hemispherical radiation.

A second meteorological shelter one mile to the north was maintained during the same period. Here observations were continued on a regular schedule until 8 July. Subsequently, only unscheduled observations were made due to the development of intervening lakes.

seismic surveys included:

- (1) an east-west traverse from the Ward Hunt Ice Rise into the re-entrant area;
- (2) a line running from north of Cape Albert Edward, south of Ward Hunt Island, to the 1954 survey line; and
- (3) two crossings of Disraeli Fjord.

Deep penetrations into Disraeli Fjord were abandoned due to thin ice and darkness in late October.

Thermoluminescence of Limestones

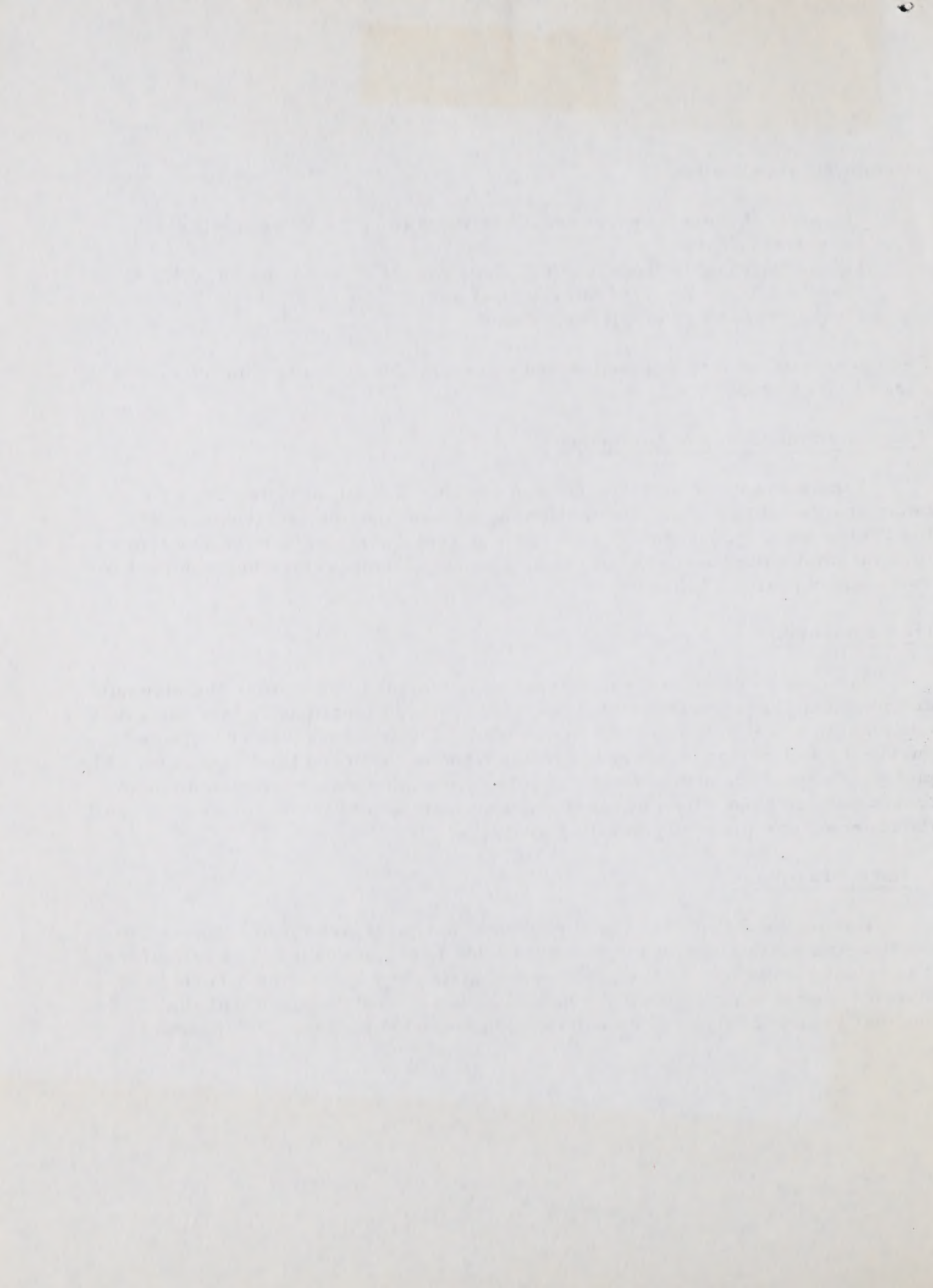
Limestone samples taken from Ward Hunt Island in September are being analyzed to provide information on the past thermal environment of the Shelf area. Initial glow curves, run on these samples showed low temperature thermoluminescences, indicating a reduced temperature environment for an extended period of time.

Ice Engineering

In order to develop ice construction techniques, determine the strength and physical characteristics of liquid cast ice, and functionally test and evaluate equipment, a test plot some 150 feet wide by 200 feet long was constructed during the fall period on a crest 3 miles NNW of the Ward Hunt campsite. The plot was formed through a series of lifts by pumping water from an adjacent trough onto an area diked by plastic tubing; samples of the water and the ice thus formed are presently awaiting analysis.

Surface Treatment

During the fall period, four experimental plots were laid out near the crest of the south slope of the Ward Hunt Ice Rise, one half mile north of the Ward Hunt campsite. These plots were constructed by placing a surface of styrofoam and/or plywood on the bare ice surface. It is hoped that the thermal regime of these plots can be documented during the 1960 period.



Two investigations planned for the 1959 program were not carried out. They were the documentation of the water column in Disraeli Fjord, and a coring effort on the Shelf. It is worth commenting that these studies were not deleted because of a lack of merit; they should be undertaken.

The results of the 1959 program are now under analysis. A preliminary report is anticipated sometime in March.

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